

# DENTISTRY STUDENTS' SELF-ASSESSMENT OF THEIR PRACTICAL SKILLS – A SURVEY STUDY

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## ABSTRACT

**INTRODUCTION:** Young dentist after graduation often have to perform a wide range of dental treatments without any assistance.

**OBJECTIVES:** The aim of the study was to assess dental education in different medical universities in Poland.

**MATERIAL AND METHODS:** A paper-pencil survey was carried out among fifth-year students of dentistry in 8 medical universities. The questionnaire assessed a self-perceived confidence in clinical skills and evaluated the level of preparation for independent work in general dental practice. Each respondent completed the given questionnaire independently in the allocated time.

**RESULTS:** Out of 500 participants, only 98 (19.6%) considered themselves well-prepared for independent work after graduation. The students felt mostly unready for endodontic treatment with rotary instruments (79.4%) and warm gutta-percha (89.2%) as well as for preparing teeth for fixed dentures (77.2%). Most students felt well-prepared for direct filling restoration (83.6%) and tooth extraction (79.8%). About half of the students considered themselves prepared for using a rubber dam (48.2%), making complete denture (58.6%), and teeth splinting (43.6%).

**CONCLUSIONS:** Dental students feel well-prepared for those procedures, which they repeated multiple times during their education. That is why clinical preparation is significant in the conditions of medical simulation for all clinical procedures, which young dentists will perform in their future work.

**KEY WORDS:** dental education, fifth-year student, questionnaire survey.

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## INTRODUCTION

The term “education” derives from Latin (Lat. *Education*) and means “upbringing”, “education”. It involves all activities and processes, which aim at sharing knowledge, shaping certain characteristics and skills. Development of education of dentistry in Europe, and particularly in the United States, occurred in the 19<sup>th</sup>

century. The American dentists Hyden and Harris contributed to its expansion by opening in 1839 the first in the world institute of teaching dentistry, the Baltimore College of Dental Surgery [1]. In Poland, the first department of dentistry was opened in 1902 in Kraków, and in that year, the Institute of Dentistry with emergency room and workshops was established. Currently in Poland, the course of dentistry is conducted in the fol-

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lowing ten universities: Jagiellonian University Medical College in Kraków, Medical University of Gdańsk, Pomeranian Medical University in Szczecin, Medical University of Silesia in Katowice, Medical University of Białystok, Medical University of Lublin, Medical University of Łódź, Poznań University of Medical Sciences, Wrocław Medical University, and Medical University of Warsaw.

Each university receives general standards of teaching dentistry; however, a detailed curriculum may vary between educational institutions. It is essential to monitor the quality of education at every individual university. One of the tools is Dundee ready education environment measure (DREEM) questionnaire, described in 1997 by Roff *et al.* [2], as a universal measure of total or partial assessment of the educational environment and atmosphere/climate of medical schools/medical professions. The questionnaire is common for all the medical professions; however, it does not apply to specific questions concerning the preparation of students for independent work as a dental practitioner and individual clinical procedures. What is significant in the work of a dentist is both, theoretical and practical preparation for independent treatment of patients.

A very important issue is to provide a high quality of education, ensuring students' proper conditions to develop their practical skills. The process of teaching needs to constantly improve with new methods of treatment, and should follow changeable expectations on the job market. For this reason, an authorial survey was created to assess the level of preparation of dentistry students, expressed by them self, for independent conducting of dental procedures.

## OBJECTIVES

The aim of this study was to evaluate dental education in different medical universities in Poland.

## MATERIAL AND METHODS

In total, 1,200 of paper versions of the questionnaire were sent to 10 medical universities in Poland in the academic year of 2015/2016. In cooperation with local branches of the Society of Dental Students, 500 correctly completed questionnaires were collected from 8 medical universities in Poland. The survey consisted of 17 dichotomous (Yes/No) questions about the preparation of students to perform various dental procedures, and one rating scale question concerning their preparation for independent work as dentists. The respondents were asked for additional information, including the city and medical university, and gender. The study included 500 dentistry students of the fifth (final) year, aged 22-33 years old. The characteristics of the study group

**TABLE 1.** Characteristics of the study group

Parameter	
Sex, n (%)	
Female	360 (71.86)
Male	140 (27.94)
Average age (years)	24.27
Medical university (in alphabetical order), n (%)	
Białystok	59 (11.80)
Gdańsk	54 (10.80)
Katowice	82 (16.40)
Kraków	49 (9.80)
Lublin	88 (17.60)
Łódź	51 (10.20)
Poznań	56 (11.20)
Warszawa	61 (12.20)
Total	500 (100)

are presented in Table 1. Names of the universities were coded randomly; the method of marking is available on request.

In the survey, the students were asked whether they feel prepared for independent conducting of dental procedures, such as direct filling restoration, using fiberglass posts, using a rubber dam, endodontic treatment with rotary instruments, endodontic treatment with warm gutta-percha, making a complete denture, preparing teeth for fixed dentures, treatment of temporomandibular disorders, treatment of tooth wear, teeth splinting, and molar extraction. Moreover, the students were requested to answer the questions concerning abilities to provide emergency help to a patient suffering from pain and systemic illnesses, calculating a dose of antibiotic, choice of painkiller, coping with a conversation with a patient as well as a course of action in case of a "difficult" patient. The students could choose one of two possible answers, "Yes" or "No". At the end, the participants assessed their level of preparation for independent work as a dentist in a 6-point scale, where 0 meant "completely unprepared for independent work", 1 – "very poorly prepared", 2 – "poorly prepared", 3 – "moderately prepared", 4 – "well-prepared", and 5 – "completely prepared for independent work". All procedures performed in the study involving the participants were in accordance with ethical standards of the Institutional and/or National Research Committee as well as with the 1964 Helsinki Declaration and its later amendments, or comparable ethical standards. The authors obtained an informed consent from each student to participate in the study. The obtained results were statistically analyzed with  $\chi^2$  test (Pearson), using Statistica v.10. program 0, with a significance level set as  $p < 0.05$ .

**TABLE 2.** Answers of the respondents regarding the preparation for independent conducting of clinical procedures

Procedure	Direct filling restoration (%)	Using of fiber glass posts (%)	Using a rubber dam (%)	Endodontic treatment with rotary instruments (%)	Endodontic treatment with warm gutta-percha (%)	Making complete denture (%)	Preparing teeth for fixed dentures (%)	Treatment of temporomandibular disorders (%)	Treatment of tooth wear (%)	Teeth splinting (%)	Tooth extraction (%)
1 Medical university	Prepared	15.25	<b>10.17</b>	11.86	5.08	47.46	27.12	13.56	38.98	<b>23.73</b>	<b>89.83</b>
	Unprepared	84.75	<b>89.83</b>	88.14	94.92	52.54	72.88	86.44	61.02	<b>76.27</b>	<b>10.17</b>
2	Prepared	<b>50.00</b>	40.74	14.81	16.67	<b>81.48</b>	27.78	61.11	51.85	44.44	83.33
	Unprepared	<b>50.00</b>	59.26	85.19	83.33	<b>18.52</b>	72.22	38.89	48.15	55.56	16.67
3	Prepared	40.24	32.93	30.49	7.32	48.78	13.41	<b>70.73</b>	40.24	35.37	84.15
	Unprepared	59.76	67.07	69.51	92.68	51.22	86.59	<b>29.27</b>	59.76	64.63	15.85
4	Prepared	8.16	83.67	12.24	10.20	69.39	<b>4.08</b>	<b>2.04</b>	<b>36.73</b>	30.61	73.47
	Unprepared	91.84	16.33	87.76	89.80	30.61	<b>95.92</b>	<b>97.96</b>	<b>63.27</b>	69.39	26.53
5	Prepared	<b>9.09</b>	10.23	<b>7.95</b>	<b>3.41</b>	<b>42.05</b>	20.45	51.14	40.91	<b>73.86</b>	84.09
	Unprepared	<b>90.91</b>	89.77	<b>92.05</b>	<b>96.59</b>	<b>57.95</b>	79.55	48.86	59.09	<b>26.14</b>	15.91
6	Prepared	18.65	<b>84.31</b>	27.45	11.76	68.63	13.73	47.06	<b>54.90</b>	37.25	<b>64.71</b>
	Unprepared	82.35	<b>15.69</b>	72.55	88.24	31.37	86.27	52.94	<b>45.10</b>	62.75	<b>35.29</b>
7	Prepared	16.07	75.00	17.86	7.14	50.00	37.50	26.79	51.79	46.43	82.14
	Unprepared	83.93	25.00	82.14	92.86	50.00	62.50	73.21	48.21	53.57	17.86
8	Prepared	32.79	83.61	<b>42.62</b>	<b>29.51</b>	77.05	<b>39.34</b>	32.79	42.62	42.62	70.49
	Unprepared	67.21	16.39	<b>57.38</b>	<b>70.49</b>	22.95	<b>60.66</b>	67.21	57.38	57.38	29.51
Total	Prepared	<b>76.20</b>	<b>48.20</b>	<b>20.60</b>	<b>10.80</b>	<b>58.60</b>	<b>22.80</b>	<b>40.80</b>	<b>44.20</b>	<b>43.60</b>	<b>79.80</b>
	Unprepared	<b>23.80</b>	<b>51.80</b>	<b>79.40</b>	<b>89.20</b>	<b>41.40</b>	<b>77.20</b>	<b>59.20</b>	<b>55.80</b>	<b>56.40</b>	<b>20.20</b>
p-value	0.44	0.00001*	0.00001*	0.00001*	0.00003*	0.00001*	0.000002*	0.0001*	0.36	0.00001*	0.012*

## RESULTS

Table 2 shows the respondents' answers concerning the preparation for independent conducting of clinical procedures. In the case of direct filling restoration, the majority of students (83.6%) stated that they were well-prepared for independent treating. The obtained answers "No" were associated with gender (Pearson's  $\chi^2 = 3.30$ ,  $df = 1$ ,  $p = 0.07$ ), and with the university, at which they studied (Pearson's  $\chi^2 = 6.91$ ,  $df = 7$ ,  $p = 0.44$ ).

The majority of the surveyed (76.2%) stated that they were well-prepared for using fiberglass posts. It was found that the negative answers were more frequently given by females than males, which was statistically significant (79.44% vs. 67.86%, respectively; Pearson's  $\chi^2 = 7.46$ ,  $df = 1$ ,  $p = 0.006$ ). Also, the universities at which they studied had a statistically significant influence on a positive self-assessment about conducting this procedure (Pearson's  $\chi^2 = 57.77$ ,  $df = 7$ ,  $p = 0.00001$ ).

A positive answer to a question about preparation for using rubber dam was given by 48.20% ( $n = 241$ ) of the students. It was revealed that the problem with the use of rubber dam was statistically significantly more often expressed by the students of MU1 (89.83%,  $n = 59$ ) and of MU5 (89.77%,  $n = 79$ ), while the students of MU6 (84.31%,  $n = 43$ ), MU4 (83.67%,  $n = 41$ ), and MU8 (83.61%,  $n = 51$ ) (Pearson's  $\chi^2 = 191.94$ ,  $df = 7$ ,  $p = 0.00001$ ) were statistically significantly more often prepared for conducting this procedure.

In the opinion of 79.40% ( $n = 397$ ) of respondents, they were not well-prepared for endodontic treatment with rotary instruments. Female students statistically more frequently chose a negative answer compared with male students (83.61% vs. 68.57%, respectively) (Pearson's  $\chi^2 = 13.94$ ,  $df = 1$ ,  $p = 0.0002$ ). The students of MU5 (92.05%) and MU1 (88.14%) statistically significantly more often gave an answer "No". The smallest number of negative responses was obtained from the students of MU8 (57.38%) and MU3 (69.51%) (Pearson's  $\chi^2 = 39.26$ ,  $df = 7$ ,  $p = 0.00001$ ).

In the case of endodontic treatment with warm gutta-percha, the majority of participants negatively assessed their preparation for conducting this procedure, with 89.20% of the students ( $n = 446$ ). The answer "No" was statistically more often chosen by female students than by their male counterparts (91.67% vs. 82.86%, respectively) (Pearson's  $\chi^2 = 8.12$ ,  $df = 1$ ,  $p = 0.004$ ).

In their opinion, a greater part of the students (58.60%) were well-prepared for conducting prosthetic rehabilitation with complete dentures. The gender did not have a statistically significant impact on the presented answers (Pearson's  $\chi^2 = 2.59$ ,  $df = 1$ ,  $p = 0.107$ ). The percentage of negative answers concerning individual universities varied from 22.95% in MU8 to 57.95% in MU5. The observed differences were statistically significant (Pearson's  $\chi^2 = 42.60$ ,  $df = 2$ ,  $p = 0.00001$ ).

The majority of the students believed that they were not prepared well enough to independently conduct preparation of teeth for fixed dentures (77.20%,  $n = 386$ ). Females statistically more frequently chose a negative answer compared to male students (80.56% vs. 68.57%, respectively) (Pearson's  $\chi^2 = 8.225$ ,  $df = 1$ ,  $p = 0.004$ ).

Only 40.80% of the respondents evaluated that they were sufficiently prepared for the treatment of temporomandibular disorders. Females statistically significantly more often answered negatively compared to males (62.50% vs. 50.71%, respectively) (Pearson's  $\chi^2 = 5.80$ ,  $df = 1$ ,  $p = 0.02$ ). The percentage of negative answers varied from 29.27% in MU3 to 97.96% in MU4 (Pearson's  $\chi^2 = 99.13$ ,  $df = 7$ ,  $p = 0.0001$ ).

Over half of the respondents stated they were not well-prepared for conducting the treatment of tooth wear (55.80%,  $n = 279$ ), while 44.20% ( $n = 221$ ) were properly prepared. The choice of the answer "No" was related to gender (Pearson's  $\chi^2 = 3.345$ ,  $df = 1$ ,  $p = 0.07$ ). The percentage of negative answers varied from 48.15% among MU2 students to 61.02% among MU1 students (Pearson's  $\chi^2 = 7.68$ ,  $df = 7$ ,  $p = 0.36$ ).

In the case of the question concerning preparation for conducting the procedure of teeth splinting, the majority of the surveyed answered that they were not sufficiently prepared – 56.40%. Females reported a problem with this procedure statistically significantly more frequently compared to males (62.78% vs. 40.0%, respectively) (Pearson's  $\chi^2 = 21.27$ ,  $df = 1$ ,  $p = 0.00001$ ). The percentage of students having problem with independent conduction of this procedure varied from 26.14% in MU5 to 76.27% in MU1 (Pearson's  $\chi^2 = 48.929$ ,  $df = 7$ ,  $p = 0.00001$ ).

The vast majority of the respondents (79.80%) claimed that they were properly prepared for conducting a tooth extraction. Males were, in their opinion, statistically significantly more often prepared for conducting this procedure compared to female counterparts (7.86% vs. 25.0%, respectively) (Pearson's  $\chi^2 = 17.963$ ,  $p = 0.012$ ).

The majority of the students (91.20%) were well-prepared for the course of action with a patient suffering from systemic diseases (Table 3). The percentage of the participants unprepared for working with such patients varied from 1.69% in MU1 to 17.65% in MU6 (Pearson's  $\chi^2 = 16.20$ ,  $df = 7$ ,  $p = 0.023$ ).

According to the assessment, 80.20% of the respondents were well-prepared for providing emergency help to a patient suffering from pain. The negative answer varied from 5.56% in MU2 to 36.73% in MU4 (Pearson's  $\chi^2 = 19.745$ ,  $df = 7$ ,  $p = 0.006$ ).

Most of the students (75.0%) answered "Yes" for the question concerning calculating a dose of antibiotics. The percentage of those who could not calculate a dose of antibiotics varied from 3.39% in MU1 to 58.93% in MU7 (Pearson's  $\chi^2 = 56.518$ ,  $df = 7$ ,  $p = 0.00001$ ).

The choice of painkiller was not a problem for 77.20% ( $n = 386$ ) of the surveyed. Neither gender nor the university had a statistically significant influence on the answers.

**TABLE 3.** Answers of the respondents regarding various clinical procedures

Procedure		Patient with systemic diseases (%)	Emergency help (%)	Calculating a dose of antibiotic (%)	Choice of painkiller (%)	Course of action with a "difficult" patient (%)	Conversation with a patient (%)	
Medical university	1	Prepared	98.31	79.66	<b>96.61</b>	76.27	<b>37.29</b>	<b>37.29</b>
		Unprepared	1.69	20.34	<b>3.39</b>	23.73	<b>62.71</b>	<b>62.71</b>
	2	Prepared	<b>98.15</b>	<b>94.44</b>	74.07	<b>88.89</b>	<b>87.04</b>	<b>87.04</b>
		Unprepared	<b>1.85</b>	<b>5.56</b>	25.93	<b>11.11</b>	<b>12.96</b>	<b>12.96</b>
	3	Prepared	92.68	85.37	70.73	79.27	57.32	50.00
		Unprepared	7.32	14.63	29.27	20.73	42.48	50.00
	4	Prepared	85.71	<b>63.27</b>	71.43	<b>65.31</b>	38.78	63.27
		Unprepared	14.29	<b>36.73</b>	28.57	<b>34.69</b>	61.22	36.73
	5	Prepared	92.05	78.41	84.09	81.82	50.00	57.95
		Unprepared	7.95	21.59	15.91	18.18	50.00	42.05
	6	Prepared	<b>82.35</b>	74.51	84.31	72.55	56.86	60.78
		Unprepared	<b>17.65</b>	25.49	15.69	27.45	43.14	39.22
	7	Prepared	85.71	76.79	<b>41.07</b>	71.43	69.64	76.79
		Unprepared	14.29	23.21	<b>58.93</b>	28.57	30.36	23.21
	8	Prepared	91.80	85.25	73.77	77.05	68.85	78.69
		Unprepared	8.20	14.75	26.23	22.95	31.15	21.31
Total	Prepared	<b>91.20</b>	<b>80.20</b>	<b>75.00</b>	<b>77.20</b>	<b>57.80</b>	<b>62.80</b>	
	Unprepared	<b>8.80</b>	<b>19.80</b>	<b>25.00</b>	<b>22.80</b>	<b>42.20</b>	<b>37.20</b>	
<i>p</i> -value		0.023*	0.006*	0.000001*	0.134	0.0001*	0.00001*	

**TABLE 4.** Preparation of students for independent work as a dentist according to their own assessment

Preparation for independent work		0	1	2	3	4	5
Medical University (%)	1	0.00	3.39	23.73	59.32	13.56	0.00%
	2	0.00	3.70	12.96	46.30	31.48	5.56%
	3	0.00	13.41	36.59	41.46	7.32	1.22%
	4	0.00	<b>16.33</b>	38.78	40.82	4.08	0.00%
	5	0.00	11.36	29.55	44.32	14.77	0.00%
	6	0.00	13.73	19.61	39.22	27.45	0.00%
	7	0.00	14.29	26.79	48.21	10.71	0.00%
	8	0.00	4.90	18.03	31.15	3.79	<b>13.11%</b>
Total		<b>0.0</b>	<b>10.2</b>	<b>26.4</b>	<b>43.8</b>	<b>17.2%</b>	<b>2.4%</b>
<i>p</i> -value	x		0.0001*	0.0001*	0.0001*	0.0001*	0.0001*

0 – completely unprepared for independent work, 1 – very poorly prepared, 2 – poorly prepared, 3 – moderately prepared, 4 – well prepared, 5 – completely prepared for independent work

\*Significance of differences  $p < 0.05$  between the particular universities

Over half of the students (57.80%) believed that they were prepared for working with a "difficult" patient. The percentage of those who answered negatively varied from 12.96% in MU2 to 62.71% in MU1 (Pearson's  $\chi^2 = 44.87$ ,  $df = 7$ ,  $p = 0.0001$ ).

More than 1/3 of the students (37.20%) responded negatively for the question regarding preparation for

conversation with a patient. In each of individual universities, the percentage of students who replied negatively varied from 12.96% in MU2 to 62.71% in MU1 (Pearson's  $\chi^2 = 48.025$ ,  $df = 7$ ,  $p = 0.00001$ ).

The answers for the question concerning the students' level of preparation for independent work at the dental office are presented in Table 4. When ana-



lyzing the structure of answers regarding a particular university, it may be observed that the students of only three medical universities selected the answer 5 (“completely prepared for independent work”), respectively: MU8 (13.11%), MU2 (5.56%), and MU3 (1.22%). None of the respondents selected the answer 0 (“completely unprepared for independent work”). In turn, in four universities, over 10% of the students selected the answer 1 (“very poorly prepared”), respectively: MU4 (16.33%), MU7 (14.29%), MU3 (13.41%), and MU 5 (11.36%). The detected differences were statistically significant (Pearson's  $\chi^2 = 98.87$ ,  $df = 28$ ,  $p = 0.00001$ ). Both in female and male students, the most frequently chosen answer was 3 (“moderately prepared”) (41.94% vs. 48.57%) as well as the answer 4 (“well-prepared”) (14.72% vs. 23.57%). The observed differences were statistically significant (Pearson's  $\chi^2 = 17.94$ ,  $df = 4$ ,  $p = 0.0013$ ). Females more critically assessed their preparation. It was especially visible in score 1 (“very poorly prepared”) (11.11% vs. 7.86%) and score 2 (“poorly prepared”) (30.56% vs. 15.71%). Also, it needs to be highlighted that only 1.67% of female students and 4.29% of male students felt completely prepared for independent work at the dental office (answer 5). A correlation between universities at which the respondents' studied was also found.

## DISCUSSION

Results of different studies show diversified level of preparation of students for conducting various dental clinical procedures.

In a contemporary dentistry, an increasing emphasis is placed on restricting access of saliva to a treated tooth. It concerns both caries treatment and filling a tooth with composite material after preparation of decay as well as endodontic treatment in adults and children. During endodontic treatment, rubber dam minimizes the risk of swallowing tools and liquids used for rinsing root canals, protects the treatment area from a contact with saliva, and simplifies the work of a dentist through improving the visibility of treated tooth [3]. Not all the surveyed students, in their opinion, learned how to use a rubber dam:  $\frac{3}{4}$  of respondents in four universities and slightly over 10% of students from two universities.

In an endodontic treatment, rotary instruments increase their popularity, which ensure better preparation of root canals with a lower risk of change in the original course of canal curvature [4]. Only in one medical university in Poland, almost half (42.62%) of the students felt competent to independently conduct endodontic treatment with rotary instruments. Correspondingly, the students from the same university constituted the most numerous group of respondents who assessed that they were ready for filling the canals with the use of warm gutta-percha (29.51%), which is a method ensuring better sealing of the root canal system than traditional cold lateral condensation [5].

A small percentage of the surveyed students was ready for preparing teeth for crowns and/ or permanent bridges (22.8%). It may be caused by the fact that this is a procedure with a high-risk of failure [6]. The students' preparation for conducting those procedures in patients should be preceded by clinical classes with appropriately high number of hours spent learning on models or using simulators. According to the authors of the present study, numerous medical simulation centers in Poland provide opportunities for better clinical preparation of potential dentists.

It was estimated that temporomandibular disorders are the most frequent cause of a headache [7]. As a result, an increasing number of patients suffering from long-term headaches report to dental offices to be treated. It is disturbing that only 40.8% of the respondents think that they can deal with a problem of temporomandibular disorders in patients.

In the opinion of the respondents, they felt well-prepared theoretically for the work as a dentist. Over  $\frac{3}{4}$  of them reported having no problem with calculating a dose of antibiotic, choice of painkiller, course of action in case of patients with systemic diseases, or with providing emergency help. It may be connected with greater contribution to theoretical education compared to practical classes, with preclinical and clinical courses.

Lack of proper preparation of the future dentists for an appropriate interpersonal relationship with a patient as well as with a team of coworkers may negatively influence the course of treatment. The doctor-patient relation is an essential part of the therapeutic process. Out of all the surveyed students, 37.2% were convinced of not having the necessary competencies in this regard, while 42.2% did not know how to deal with a “difficult” patient. It seems crucial to provide a curriculum with a higher number of hours as well as conducting various forms of classes regarding doctor-patient communication, especially within the courses of occupational safety and health in dentistry, gerostomatology, children's dentistry, and integrated dental medicine.

The interesting fact found in the present study was, that in case of clinical procedures, male students more often than females better evaluated their preparation for the professional work. However, this could be associated with the fact that generally in all aspects, male participants answered their questions with greater confidence than their female counterparts [8]. Although, it is obvious that self-confidence and belief in one's preparation for work as a dentist does not always correspond to real practical skills obtained during studies.

In the study of Honey *et al.*, in a self-assessment of 108 dentistry graduates, only 32.4% of respondents evaluated their preparation as good for conducting preventive resin restorations in children. Over half (54.4%) claimed that they were properly prepared for the procedure of pit and fissure sealant. Nearly half of the respondents (46.3%) perceived themselves as competent to assess caries risk in a patient. The results of those studies show that the current

curriculum does not fully prepare future doctors for independent work both in Polish and foreign conditions [9].

Studies assessing the level of preparation for procedures of future dentists conducted at universities in Cardiff and Cork also show well preparation of students for performing simple procedures, such as scaling, placement of preventive resin restorations in front and lateral teeth, or using a rubber dam. In contrast, the surveyed students did not feel prepared for more complex procedures, which were significantly less learned by them during studies, including surgical extractions, whitening of teeth, preparation of teeth for veneers, crowns, bridges, and simple orthodontic procedures [10].

A Polish study conducted at the Wrocław Medical University also confirmed the fact of well preparation of students, in their opinion, for simple procedures, such as placement of preventive resin restorations in front and lateral teeth, or pit and fissure sealant, while as difficult, the students considered preparation of canals with rotary instruments, canals' filling with the use of apical condensation or thermoplastic material, and tooth replantation. However, the students only assessed their preparation for procedures from the scopes of conservative dentistry and developmental age dentistry [11].

Dentistry students from Hong-Kong claimed that they were well-prepared for conducting simple procedures, such as filling restorations in front and lateral teeth, endodontic treatment of single-root canal, scaling, replacing teeth with partial dentures, or simple extractions. However, the students indicated problems, including endodontic treatment of multi-root canal tooth, replacing teeth with complete dentures and conventional bridges, periodontal surgery for pocket management, replacing teeth with implants (prosthetics), orthodontic procedures, and complex tooth extractions (e.g., impacted third molars) [12]. Similarly, dentists with 4 years of work experience from Great Britain evaluated that they were well-prepared for conducting simple procedures from the scope of dental surgery, while approximately 1/5 of respondents did not feel sufficiently prepared for conducting more complex procedures, such as surgical management of a failed extraction or bone removal [13].

Also, young dentists who just completed their education at the School of Dentistry in Western Australia, confirmed that they were well-prepared for conducting procedures, which they frequently practiced during studies, such as amalgam restoration, anterior endodontics, single crowns, and full dentures. In turn, the most problematic procedures they found included gold inlays/onlays, occlusion-related problems, and assessment and treatment of a trauma [14].

Therefore, in education, the remaining problem considers didactic methods, which would need to be implemented in the training of future dentists to become therapeutically effective in independent clinical practice, especially in general dentistry. The comparison of the efficacy of teaching methods regarding the ability

to decide on prosthetic rehabilitation, with either lecture or discussion in small groups, did not provide any unequivocal response, which of those methods would be more effective way of teaching [15]. In contrast, in a similar study, different results were obtained, showing that working in small groups improves abilities to perform practical procedures compared to lectures. However, it also revealed that neither of the above-mentioned forms of teaching influences the results of written tests verifying theoretical knowledge of students [16].

The objective assessment of progress in education of dentistry students and the necessity of spending additional time on proper conducting of procedures may be facilitated by various methods, such as those from the University of Carolina, USA, where a special program for evaluation of teeth preparation for prosthetic fillings during preclinical classes was invented. 80% of the students were assessed based on computer evaluation of work scan, and 20% of them were evaluated by a teacher in those aspects, which could not be assessed by computer, e.g., finish line smoothness and overall smoothness. Then, the students for half a year were performing procedures in clinical conditions and their work was assessed according to standard rules by a teacher. After this period, the students filled anonymous surveys, in which they compared both evaluating methods. The vast majority of students preferred E4D compare system, which was evaluated by them as more objective, and precisely showing those areas where they should improve their skills [17].

## CONCLUSIONS

Based on the present study and cited references, it may be said that students feel well-prepared for those procedures, which they repeated multiple times during their education. Therefore, clinical preparation in the conditions of medical simulation for all the clinical procedures that young dentists will perform in their future work is particularly essential. At the same time, the curriculum should not fail to teach interpersonal abilities, such as a conversation with the patient or dealing with, so-called "difficult patient".

## CONFLICT OF INTEREST

The authors declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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